

PROGRAMMABLE HOUSEHOLD APPLIANCE WITH A DISPLAY DEVICE

5 Cross-Reference to Related Application:

This application is a continuation, under 35 U.S.C. § 120, of
copending international application No. PCT/EP02/08088, filed
July 19, 2002, which designated the United States; this
application also claims the priority, under 35 U.S.C. § 119,
10 of German patent application No. 101 48 453.4, filed October
1, 2001; the prior applications are herewith incorporated by
reference in their entirety.

Background of the Invention:

15 Field of the Invention:

The invention relates to a programmable household appliance
with a display device for audible or visual symbols and with a
memory area for the program control device, which is
configured to store selected program parameters and to store
20 measurement and operating values of the actuators and sensors
that are involved in the operating process taking place.

Such a household appliance is described based upon a washing
machine in German Published, Non-Prosecuted Patent Application
25 DE 198 34 230 A1. For such a household appliance, it will be
desirable for the user to be able to obtain information about

the manner in which the work program that was previously selected by him and is associated with ingredients was actually carried out. For example, the user of a washing machine could verify, from his washing, the washing and spin-drying result that has been achieved. However, if the result is unsatisfactory in any way whatsoever, the user generally does not know the reason why the washing or spin-drying result has not led to him being satisfied. Such an unsatisfied user will often contact customer service even though, if he were to know the circumstances that had actually occurred with regard to the operating process being complained about, he could possibly have satisfied himself by changing the procedure for inputting parameters for future operating processes.

15 Summary of the Invention:

It is accordingly an object of the invention to provide a programmable household appliance with a display device that overcomes the hereinafore-mentioned disadvantages of the heretofore-known devices of this general type and that provides the customer for a household appliance of the type mentioned initially with the capability to obtain details about the work program that was in each case most recently carried out.

25 With the foregoing and other objects in view, in a programmable household appliance having actuators and sensors

involved in an operating process, there is provided, in accordance with the invention, a display assembly for at least one of audible and visual symbols including a program control device connected to the actuators and sensors, a memory
5 connected to the program control device, the program control device being programmed to store in the memory selected program parameters and measurement and operating values of the actuators and sensors, a display element for at least one of audible and visual symbols, the display element being
10 connected to the program control device, and the program control device being programmed to switch on the display element once the operating process has completed and to cause the display element to display information about an ability to output information regarding the measurement and operating
15 values stored at least one of before and during the operating process most recently carried out.

With the objects of the invention in view, in a programmable household appliance having actuators and sensors involved in
20 an operating process, a memory, and a program control device connected to the memory, to the actuators, and to the sensors, the program control device being programmed to store in the memory selected program parameters and measurement and operating values of the actuators and sensors, there is also
25 provided a display assembly for at least one of audible and visual symbols including a display element connected to the

program control device, the display element being switched on by the program control device once the operating process has completed, and displaying information about a capability to output information about the measurement and operating values
5 stored at least one of before and during the operating process most recently carried out.

With the objects of the invention in view, in a programmable household appliance, there is also provided a control system
10 including a program control device, actuators and sensors involved in an operating process of the appliance, the actuators and the sensors connected to the program control device, a display for at least one of audible and visual symbols being connected to the program control device, the
15 display device having a display element, a memory area connected to the program control device, the program control device being programmed to store in the memory selected program parameters and measurement and operating values of the actuators and sensors, and to switch on the display element
20 once the operating process has completed and to display with the display element information about a capability to output information about the measurement and operating values stored at least one of before and during the operating process most recently carried out.

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With the objects of the invention in view, there is also provided a display for a programmable household appliance having a program control device, actuators, sensors, a memory for the program control device storing selected program

5 parameters and storing measurement and operating values of the actuators and sensors involved in an operating process taking place, the display including a display device for at least one of audible and visual symbols, the display device having a display element switched on once the operating process has
10 completed, the display element displaying information about a capability to output information about the measurement and operating values that were stored at least one of before and during the operating process that was most recently carried out.

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According to the invention, the display device has a display element that is switched on once the operating process has been completed, and includes information about the capability to output information about measurement and operating values
20 that were stored before and/or during the operating process that was most recently carried out. Such a capability informs the user of a household appliance, without him having to do anything else, of whether or not the previously selected operating process was actually carried out in the way that the
25 user had envisaged the process based upon the settings made. Specifically, at the end of an operating process that has been

carried out, appropriate information can be displayed to the user, if the subject matter of the invention is integrated in the household appliance. If a speech module is fitted, the information may, for example, be output audibly. If a display
5 is provided, however, such information can also be displayed visually.

Specifically, if the display device has an at least single-line display and the information is an image of an
10 alphanumeric word that can be interpreted by the operator, the user can use this to obtain information relating to stored parameters that can be called up about the operating process that has most recently been carried out.

15 In accordance with another feature of the invention, the word should be understood as being information about a record that can be called up by the operator about the work program that was most recently carried out. By way of example, this actually may be the word "record."

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If the display element has an associated operating device, whose operation makes it possible to initiate a sequence of information outputs about measurement and operating values, the user can retrieve the information from the record directly
25 on the display, and can read it. For such a purpose, the information (which, for example, is in audible form) can be

initiated by a request, which is, likewise, in audible form. However, the operating device may also be a key that can be operated manually in the manner corresponding to previously normal usage and is disposed physically alongside the visual display element of a multi-line display. Then, by way of example, the sequence of information outputs can be continued item by item whenever the operating device is operated.

In this way, the information that is desired by the user can be read directly from the display and can be compared with the user's pre-selected settings.

In accordance with a further feature of the invention, the display element has a multi-line display with a visual display element and the operating device is a manually operated key disposed alongside the visual display element.

In accordance with an added feature of the invention, the measurement values relate to a measured program duration.

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The information that can be output may relate to the selected program parameters for the operating process that was most recently carried out. However, instead of the program parameters or in addition to them, the information may also relate to the measurement and operating values for the operating process that was most recently carried out.

Measurement values such as these may be the automatically determined load quantity with washing to be treated, the amount of energy consumed, the amount of water consumed, the intensity of treatment sections, specifically, the main
5 washing and/or rinsing, the final rinsing, or spin drying.

The operating values to be checked in a washing machine or dishwasher may relate to foam identification and, in a washing machine, may relate to the spin-drying program section
10 procedure. In such a case, it is of particular interest whether or not and how often the start of spin drying was terminated as a result of an unbalance that was classified as excessive, and/or whether or not the spin-drying rotation speed was possibly reduced for this reason. Further program
15 sections, which will not be mentioned in any more detail here, in washing machines or other programmable household appliances may, likewise, be the object of retrospective considerations.

Other features that are considered as characteristic for the
20 invention are set forth in the appended claims.

Although the invention is illustrated and described herein as embodied in a programmable household appliance with a display device it is, nevertheless, not intended to be limited to the
25 details shown because various modifications and structural changes may be made therein without departing from the spirit

of the invention and within the scope and range of equivalents of the claims.

The construction and method of operation of the invention,
5 however, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings.

10 Brief Description of the Drawings:

FIG. 1 is a diagrammatic front elevational view of a control panel for a washing machine with a display equipped according to the invention;

15 FIG. 2 is a diagrammatic enlarged elevational view of the display of FIG. 1, illustrating the preselected program parameters;

FIG. 3 is a diagrammatic elevational view of the display of
20 FIG. 2 illustrating a measurement value for the program duration; and

FIG. 4 is a diagrammatic elevational view of the display of
FIG. 2 illustrating an operating value for foam formation in
25 the rinsing phase of the work program that has been carried out.

Description of the Preferred Embodiments:

Referring now to the figures of the drawings in detail and first, particularly to FIG. 1 thereof, there is shown a handle plate 2 for a detergent drawer, normally disposed on one side of the control panel 1 of a washing machine, but of no importance for the invention. The control panel 1 has two keys 3 and 4 for electrical connection of the washing machine to the mains power supply "On" and for starting up the selected operating process "Start." The display 5 is flanked on the right and left by a column of keys 6 to 9 and 10 to 13, respectively. The state shown by the display 5 in FIG. 1 relates to the program end of an "Easy care 40°C" operating process that has been carried out (display in field 14). The image of the phrase "Program end" in field 15 signals the end of the operating process that has been carried out. The field 16 shows the word "Record" immediately alongside the key 9 and, thus, indicates that a record of the operating process that has most recently been carried out can be called up by pushing the key 9. An image as shown in FIG. 2, then, appears on the display 5.

In such a case, the previous field 14 has been subdivided into the fields 17 and 18. The field 17 now shows the "Record" state, and the field 18 shows the "End" option. Field 15 now shows the selected data for the chosen program in the first of

five possible images. In such a case, washing factors that have been taken into account are displayed by the icons 19, which need not necessarily apply to the chosen program in the present example, but are merely intended to represent an
5 example. The field 20, on one hand, shows at (1/5) that the display shown is the first of five possible displays.

On the other hand, the word "Next" shown on the right alongside the key 9 indicates that operation of the key 9 will
10 result in the next (second) of the five possible displays being displayed.

The second of the five displays is shown in FIG. 3. While the displays in the fields 17 and 18 have not changed, the field
15 15 now indicates the program duration. The words "Program duration" and, for example, "1:15" are displayed for such a purpose, indicating that the operating process that was carried out actually lasted for one hour and 15 minutes. The predicted program duration when displaying the selected
20 program before the start of the operating process may, perhaps, have been only 1 hour and 5 minutes. Following the display "1:15", the user now knows that the operating process actually took 10 minutes longer. In addition to the display "2/5" for the second of five possible displays of recorded
25 parameters in the field 20, the word "Previous" now also indicates that the previous display (1/5 as shown in FIG. 2)

can be returned to on the display by operating the key 13 located alongside it.

FIG. 4 shows a display "4/5" after scrolling through the display "3/5", in which the field 15 shows an operating value, specifically, "Foam identified," which indicates that foam formation in the rinsing suds was still sensed at the end of the rinsing phase within the operating process. Furthermore, the program system has used this to generate the statement that "Too much detergent" was used and, likewise, indicates this in the field 15.

As soon as the key 10 that is located on the left alongside the field 18 "End" is pressed, the record display is deleted. The display, then, may either be switched off completely or may, once again, indicate the same display as immediately after the program end (as in FIG. 1).

In contrast to the described exemplary embodiment and without departing from the invention, further parameters may, of course, also be displayed as measurement or operating values. More or less than five pages (or display levels) may be selected on the display for this purpose. The display would, then, change in a corresponding manner to "a/x".

In addition, any of the recorded measurement values or operating values can be output audibly if the record output function is indicated audibly, as already mentioned further above.

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The measures according to the invention for a household appliance improve the customer usefulness and help the customer to learn how to save energy and resources. In addition, the customer is, in this way, made more familiar

10 with the sensor system used in a household appliance.